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## PATENT ABSTRACTS OF JAPAN

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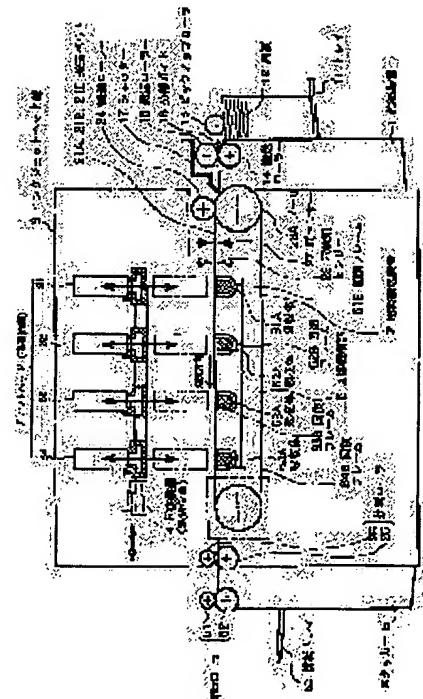
(72)Inventor : MUKASA MITSUHIRO

## (54) PRINTER

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a printer in which a print head can be recovered without interrupting print operation even in the case of continuous print operation.

**SOLUTION:** Carrying belts 21A, 21B, 21C have a plurality of holes, respectively, and a recovery mechanism section 6 for print heads 31-34 is provided to face the print heads 31-34 through the carrying belts 21A, 21B, 21C. When continuous printing is performed on a large number of sheets 12, ink for recovering the print heads 31-34 is ejected therefrom toward the plurality of holes on the carrying belts 21A, 21B, 21C at the print position of the print heads 31-34 at such a timing as no sheet 12 is present on the carrying belts 21A, 21B, 21C and that ink is absorbed at the recovery mechanism section 6.



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**CLAIMS****[Claim(s)]**

[Claim 1] A conveyance means to provide a conveyance belt and to convey a form on this conveyance belt. A printing means to provide a print head which carries out the regurgitation of the ink in a predetermined printing location, and to print by breathing out ink from said print head to a form on said conveyance belt conveyed by said conveyance means. A recovery device means to perform recovery of said print head. It is the printer equipped with the above. Said conveyance belt has two or more holes at a predetermined gap in the conveyance direction of a form. Said printing means two or more holes formed in said conveyance belt from this print head in a printing location of said print head at the time of recovery of said print head -- respectively -- alike -- receiving -- ink -- discharge --. Said recovery device means is arranged so that it may counter with said print head through said conveyance belt, and it is characterized by absorbing ink breathed out from said print head at the time of recovery of said print head.

[Claim 2] It is the printer characterized by having two or more holes which are each of the conveyance direction of a form, and the cross direction of said conveyance belt, and shifted a phase at equal intervals by said conveyance belt so that it may start throughout width of face of this conveyance belt in a printer according to claim 1.

[Claim 3] the printer characterized by to have a hole detection means detect two or more of said holes, for two or more of said holes to boil said printing means from this print head in a printing location of said print head based on a detection result in said hole detection means, respectively at the time of recovery of said print head, to receive [ are arranged to said print head at the conveyance direction upstream of a form, ] in a printer according to claim 1 or 2, and to carry out the regurgitation of the ink.

[Claim 4] In a printer according to claim 3, it is arranged to said hole detection means at the conveyance direction upstream of a form. It has a paper detection means to detect a form on said conveyance belt conveyed by said conveyance means. Said printing means a printer characterized by said two or more holes being alike, respectively, receiving from this print head in a printing location of said print head based on a detection result in said hole detection means and a paper detection means at the time of recovery of said print head, and carrying out the regurgitation of the ink.

[Claim 5] It is the printer characterized by carrying out the regurgitation of the ink for performing recovery of said print head to this print head to timing to which a form does not exist on said conveyance belt based on a detection result in said hole detection means and said paper detection means when printing actuation with said continuous printing means is performed in a printer according to claim 4.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the printer which performs recovery of a print head especially about the printer of the ink jet recording method which breathes out ink and performs printing to a form from a print head.

[0002]

[Description of the Prior Art] Before, in the printer of the ink jet recording method using the print head of a line head mold, printing to a form is performed by breathing out ink from the nozzle of a print head to the form conveyed by the position.

[0003] In such a printer, when the nozzle of a print head dries, there is a possibility that the ink regurgitation from a nozzle may become instability. For this reason, processing which a nozzle does not dry, such as sealing a print head with a cap at the time of un-printing, is performed.

[0004] However, during printing actuation, even if processing of sealing a print head at the time of un-printing is performed, since the nozzle is always in contact with the open air, a possibility that the nozzle for which the ink regurgitation is not performed will dry is large.

[0005] for this reason -- many -- when continuous printing actuation is performed to the form of several sheets, recovery which makes ink breathe out from all the nozzles of a print head for every predetermined time is performed.

[0006]

[Problem(s) to be Solved by the Invention] However, it sets to the conventional printer which was mentioned above. Since the recovery location where recovery of a print head is performed is located in a different location from the printing location where a print head is located during printing actuation, When recovery of a print head is performed during continuous printing actuation, it is necessary to once interrupt printing actuation and to move a print head to a recovery location from a printing location, and, thereby, there is a trouble that printing time amount will become long.

[0007] it aims at offering the printer which can perform recovery which is a print head, without interrupting printing actuation, when this invention is made in view of the trouble which a Prior art which was mentioned above has and it performs continuous printing actuation.

[0008]

[Means for Solving the Problem] A conveyance means for this invention to possess a conveyance belt in order to attain the above-mentioned object, and to convey a form on this conveyance belt, A printing means to provide a print head which carries out the regurgitation of the ink in a predetermined printing location, and to print by breathing out ink from said print head to a form on said conveyance belt conveyed by said conveyance means, It is the printer which comes to have a recovery device means to perform recovery of said print head. Said conveyance belt It has two or more holes at a predetermined gap in the conveyance direction of a form. Said printing means two or more holes formed in said conveyance belt from this print head in a printing location of said print head at the time of recovery of said print head -- respectively -- alike -- receiving -- ink -- discharge -- Said recovery device means is arranged so that it may counter with said print head through said conveyance belt, and it is characterized by absorbing ink breathed out from said print head at the time of recovery of said print head.

[0009] Moreover, said conveyance belt is characterized by having two or more holes which are each of the conveyance direction of a form, and the cross direction of said conveyance belt, and shifted a phase at equal intervals so that it might start throughout width of face of this conveyance belt.

[0010] moreover, it is characterized by for it to be arranged to said print head at the conveyance direction upstream of a form, and to have a hole detection means detect said two or more holes, for said two or more holes to boil said printing

means from this print head in a printing location of said print head based on a detection result in said hole detection means, respectively at the time of recovery of said print head, to receive, and to carry out the regurgitation of the ink. [0011] It is arranged to said hole detection means at the conveyance direction upstream of a form, and has a paper detection means to detect a form on said conveyance belt conveyed by said conveyance means. Moreover, said printing means it is characterized by said two or more holes being alike, respectively, receiving from this print head in a printing location of said print head based on a detection result in said hole detection means and a paper detection means, at the time of recovery of said print head, and carrying out the regurgitation of the ink.

[0012] Said printing means is characterized by carrying out the regurgitation of the ink for performing recovery of said print head to this print head to timing to which a form does not exist on said conveyance belt based on a detection result in said hole detection means and said paper detection means, when continuous printing actuation is performed.

[0013] In this invention constituted as mentioned above (Operation) A conveyance belt has two or more holes, and further, the recovery device section which performs recovery of a print head is prepared so that it may counter with a print head through a conveyance belt, and it sets for a printing means. Ink which ink was breathed out to two or more holes formed in a conveyance belt from this print head in a printing location of a print head, and was breathed out from a print head at the time of recovery of a print head is absorbed in the recovery device section.

[0014] Thereby, recovery of a print head is performed, without moving a print head from a printing location.

[0015] moreover, this invention -- setting -- many -- when continuation printing is performed to a form of several sheets, ink for performing recovery of a print head to this print head to timing to which a form does not exist on a conveyance belt is breathed out.

[0016] Thereby, printing actuation is not interrupted for recovery of a print head, and compaction of print time amount can be aimed at.

[0017]

[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained with reference to a drawing.

[0018] Drawing 1 is the cross section showing one gestalt of implementation of the printer of this invention. Moreover, drawing 2 is the plan of the form transport device 2 shown in drawing 1 , and the recovery device section 6.

[0019] Feed equipment 1 for this gestalt to feed with a form 12 at a gap fixed one sheet at a time, as shown in drawing 1 , The form transport device 2 which is a conveyance means to provide the conveyance belts 21A, 21B, and 21C, and to convey the form 12 with which it was fed by feed equipment 1 on the conveyance belts 21A and 21B and 21C, The ink jet head section 3 which prints by breathing out ink to the form 12 conveyed by the form transport device 2 and which is a printing means, The recovery device 4 which performs recovery of the ink jet head section 3 at the time of un-printing, The stacker 5 for stocking the form 12 with which printing was performed in the ink jet head section 3, it arranges inside the form transport device 2 -- having -- many, when continuation printing to the form 12 of several sheets is performed It consists of conveyance belts 21A and 21B and the recovery device section 6 which performs recovery of the ink jet head section 3 to the timing (between papers is called hereafter) to which a form 12 does not exist on 21C and which is a recovery device means.

[0020] In addition, in the following publications, the recovery of the ink jet head section 3 performed by the recovery device section 6 between the papers of a form 12 is especially called the recovery between papers.

[0021] The pickup roller 13 for feed equipment 1 to feed paper to the tray 11 on which a form 12 is set, and the form 12 set to the tray 11, The conveyance rollers 14 and 15 for leading the form 12 to which paper was fed with the pickup roller 13 to the form transport device 2, It consists of shutters 17 for amending the separation guide 16 for preventing \*\*\*\* of the form 12 led to the form transport device 2, and the skew of the form 12 led to the form transport device 2.

[0022] The ink jet head section 3 consists of print heads of four colors of a print head 31 (black arm head), a print head 32 (cyanogen arm head), a print head 33 (Magenta arm head), and a print head 34 (yellow arm head) so that a full color image can be formed.

[0023] Each of print heads 31-34 is the line arm head by which the nozzle was arranged in the conveyance direction and the rectangular direction, and the ink of each color is breathed out from the nozzle arranged in the conveyance direction and the rectangular direction.

[0024] Moreover, each of print heads 31-34 can move up and down with a drive (un-illustrating) in an evacuation location (continuous line section) and a printing location (break-line section), moves to a printing location at the time of printing and the recovery between papers, performs the ink regurgitation, and returns to an evacuation location at the time of un-printing.

[0025] A recovery device 4 carries out sequential migration, performs recovery to each of print heads 31-34 in each recovery location of the print heads 31-34 which are movable in an evacuation location (break-line section) and each

recovery location (continuous line section) of print heads 31-34, and are in an evacuation location with a drive (un-illustrating) at the time of un-printing, and returns to an evacuation location at the time of printing.

[0026] In this gestalt, although it is constituted so that a recovery device 4 may perform recovery to all the print heads 31-34, you may be the configuration of forming two or more recovery devices 4 corresponding to each of print heads 31-34.

[0027] The stacker 5 consists of paper output trays 53 for stocking the form 12 to which paper was delivered with the delivery rollers 51 and 52 and the delivery rollers 51 and 52 for delivering paper to the form with which printing was performed in the ink jet head section 3.

[0028] The form transport device 2 possesses two or more hole 21a-1-21a-5 for passing the ink breathed out from print heads 31-34 at the time of the recovery between papers, as shown in drawing 1 and drawing 2, 21b-1-21b-5, and 21c-1-21c-5, respectively. The conveyance belts 21A, 21B, and 21C which carry out support conveyance of the form 12, and the motor 22 and Pulleys 23A and 23B for making the conveyance belts 21A, 21B, and 21C drive, The conveyance roller 24 for leading the form 12 with which it was fed by feed equipment 1 on the conveyance belts 21A and 21B and 21C, The delivery rollers 25 and 26 for leading the conveyance belts 21A and 21B with which printing was performed in the ink jet head section 3, and the form 12 on 21C to a stacker 5, In order to detect hole 21a-1 formed in conveyance belt 21A as the paper sensor 27 which is a paper detection means for detecting the head of the form 12 led on the conveyance belts 21A and 21B and 21C with the conveyance roller 24 It consists of hole detection sensors 28 which are the hole detection means arranged in the location which can detect hole 21a-1.

[0029] In addition, in each of the conveyance belts 21A, 21B, and 21C, two or more hole 21a-1-21a-5, 21b-1-21b-5, and 21c-1-21c-5 are arranged at the predetermined gap in the conveyance direction at several places.

[0030] Moreover, it sets to each of the conveyance belts 21A, 21B, and 21C. When the conveyance belts 21A, 21B, and 21C are moving in the conveyance direction Two or more hole 21a-1-21a-5, 21b-1-21b-5, and 21c-1-21c-5 are always in agreement in the conveyance direction and the rectangular direction, and they are arranged so that it may counter with all the nozzles prepared in print heads 31-34.

[0031] Drawing 3 is the amplification plan of conveyance belt 21A shown in drawing 2 , and drawing showing the condition at the time of all hole 21a-1-21a-5 [ in / in (a) / conveyance belt 21A ] passing the paper sensor 27 and the hole detection sensor 28 and (b) are drawings showing the condition at the time of hole 21a-5 in conveyance belt 21A reaching just under the paper sensor 27. Here, arrangement of two or more holes which can be set to the conveyance belts 21B and 21C although conveyance belt 21A is explained is the same as arrangement of two or more holes which can be set to conveyance belt 21A.

[0032] as are shown in drawing 3 (a), and started throughout the width of face W of conveyance belt 21A in conveyance belt 21A, the conveyance direction and the direction of width-of-face W of conveyance belt 21A are alike, respectively, a phase is shifted at equal intervals, two or more hole 21a-1-21a-5 are arranged, and a mutual distance in the conveyance direction of two or more each of hole 21a-1-21a-5 is Lhh.

[0033] In addition, above conveyance belt 21A, the print head 31 by which head 31A was arranged in the conveyance direction and the rectangular direction in the location shown in drawing 3 is arranged.

[0034] Moreover, in conveyance belt 21A, the distance Lsh from the location where nozzle 31A is arranged right above to the paper sensor 27, and the relation to Lsh>Lh with the range Lh in which two or more hole 21a-1-21a-5 are formed are constituted so that it may become.

[0035] In this gestalt at the time of the recovery between papers of print heads 31-34 (refer to drawing 1 ) First, if hole 21a-1 is detected by the hole detection sensor 28 and hole 21a-1 is detected, in order to measure the timing which performs recovery between papers, when hole 21a-5 will reach just under the paper sensor 27 When a form 12 is detected by the paper sensor 27 and a form 12 is not detected, it will be distinguished if the form 12 does not exist on two or more a-hole 21a-1 - 215, and the recovery between papers of print heads 31-34 is started at this event.

[0036] Although ink will be first breathed out towards two or more hole 21a-1-21a-5 from head 31A arranged by the print head 31 if the recovery between papers of print heads 31-34 is started Since it is constituted in conveyance belt 21A so that the relation between distance Lsh and Range Lh in Lsh>Lh may become as mentioned above, from head 31A, ink will be breathed out in order of hole 21a-1, 21a-2, 21a-3, 21a-4, and 21a-5.

[0037] The absorbers 61A-64A for absorbing the ink breathed out from each of print heads 31-34 at the time of the recovery between papers, as the recovery device section 6 is shown in drawing 1 and drawing 2 , The recovery frames 61B-64B for holding the ink absorbed by Absorbers 61A-64A being alike, respectively, It consists of the ink pipes 61C-64C and Tubes 61D-64D for attracting the ink which the recovery frames 61B-64B were alike, respectively, and was held. The ink held with the recovery frames 61B-64B is attracted by pumping plant (un-illustrating) through the ink pipes 61C-64C and Tubes 61D-64D.

[0038] Through the conveyance belts 21A, 21B, and 21C, each of Absorbers 61A-64A and the recovery frames 61B-64B is arranged so that it may counter with each of print heads 31-34.

[0039] Moreover, each of Absorbers 61A-64A is formed by porosity material so that easily [ absorption of ink ].

[0040] Below, the printing actuation in the printer constituted as mentioned above is explained. In addition, in the following publications, it explains as that by which a full color image is printed in a printer.

[0041] If a printing command is transmitted from a control unit (un-illustrating), in feed equipment 1, the form 12 to which paper was fed to the form 12 set to the tray 11 with the pickup roller 13, and was fed with the pickup roller 13 will be led to the form transport device 2 with the conveyance rollers 14 and 15.

[0042] At this time, all the print heads 31-34 move to a printing location (break-line section) from an evacuation location (continuous line section) in the ink jet head section 3.

[0043] The form 12 led to the form transport device 2 from feed equipment 1 is led on the conveyance belts 21A and 21B and 21C with the conveyance roller 24, and passes the lower part of the ink jet head section 3 with the conveyance belts 21A, 21B, and 21C after that.

[0044] In addition, in the paper sensor 27, the head of the conveyance belts 21A and 21B and the form 12 led on 21C is detected, and, thereby, the timing to which a form 12 passes the lower part of the ink jet head section 3 is measured.

[0045] If a form 12 passes the lower part of the ink jet head section 3, to this form 12, ink will be breathed out from each of print heads 31-34, and printing will be performed.

[0046] The form 12 with which printing was performed by print heads 31-34 is led to the delivery rollers 25 and 26 with the conveyance belts 21A, 21B, and 21C, and is stocked by the paper output tray 53 with the delivery rollers 25 and 26 and the delivery rollers 51 and 52 after that. Thereby, the printing actuation for one sheet of a form 12 is completed.

[0047] this gestalt -- setting -- many -- when continuation printing is performed to the form 12 of several sheets, the above-mentioned actuation is repeated continuously, and recovery between papers of the print heads 31-34 in the recovery device section 6 is performed for every predetermined time amount.

[0048] And after all printing actuation is completed, print heads 31-34 perform recovery of the print heads 31-34 which moved to the evacuation location from the printing location, and the recovery device 4 moved to the evacuation location.

[0049] A process in case recovery between papers in the recovery device section 6 shown in drawing 1 is performed to below is explained.

[0050] Drawing 4 is a flow chart for explaining a process in case recovery between papers in the recovery device section 6 shown in drawing 1 is performed.

[0051] If a printing command is transmitted from a control unit (un-illustrating) (step S1), all the print heads 31-34 will move to a printing location from an evacuation location (step S2).

[0052] If all the print heads 31-34 move to a printing location, the timer function in a control unit will start actuation to this and coincidence (step S3), and the printing actuation to a form 12 will be started after that in each part prepared in the printer (step S4).

[0053] And termination of the printing actuation for one sheet of the form 12 in the ink jet head section 3 compares the printing time amount  $T_p$  which has passed after printing to a form 12 was started with the predetermined time amount  $T$  set up beforehand in a control unit (step S5).

[0054] When the printing time amount  $T_p$  has a comparison result smaller than the predetermined time amount  $T$  in step S5 (i.e., when printing actuation is completed by the predetermined time amount  $T$ ), it is distinguished whether all printing actuation is completed (step S6).

[0055] After all printing actuation is completed in step 6, when it is distinguished, without performing recovery between papers, processing is completed, and as mentioned above, print heads 31-34 perform recovery to the print heads 31-34 which moved to the evacuation location from the printing location, and the recovery device 4 moved to the evacuation location.

[0056] Moreover, after all printing actuation is not completed in step S6, when it is distinguished, the printing actuation to return and the following form 12 is started by the processing in step S4.

[0057] On the other hand, when the printing time amount  $T_p$  has a comparison result bigger than time amount  $T$  in step S5, in order to measure the timing which performs recovery between papers of print heads 31-34, detection of hole 21a-1 formed on conveyance belt 21A in the hole detection sensor 28 is started (step S7).

[0058] In addition, in the hole detection sensor 28, when the form 12 exists on a-hole 211 in conveyance belt 21A, hole 21a-1 shall not be detected.

[0059] When hole 21a-5 reach just under the paper sensor 27, detection of a form 12 will be performed in the paper sensor 27 (step S8) and a form 12 will not be detected as shown in drawing 3 (b) if hole 21a-1 is detected in step S7,

recovery between papers of the print heads 31-34 in the recovery device section 6 is performed (step S9).

[0060] In addition, time amount after hole 21a-1 is detected by the hole detection sensor 28 until hole 21a-5 pass the paper sensor 27 is beforehand computed by the range Lh in which hole 21a-1- hole 21a-5 in conveyance belt 21A are formed, and the bearer rate of conveyance belt 21A.

[0061] On the other hand, when hole 21a-1 is not detected in step S7, detection of hole 21a-1 by the hole detection sensor 28 is performed repeatedly.

[0062] After the recovery between papers in step S9 is completed, the timer function in a control unit is reset (step S10), and the timer function in return and a control unit starts actuation to the processing in step S3.

[0063] Moreover, if a form 12 is detected in step S8, at this event, return and the timing which performs recovery between papers of print heads 31-34 will be again measured by the processing in step S7, without performing recovery between papers of the print heads 31-34 by the recovery device section 6.

[0064] Next, the recovery actuation between papers of the recovery device section 6 in step S9 shown in drawing 4 is explained with reference to drawing 2 and drawing 3 .

[0065] If hole 21a-1, 21b-1, and 21c-1 move just under a print head 31 Ink is breathed out to hole 21a-1 which has moved, 21b-1, and 21c-1 from the nozzle located right above hole 21a-1, 21b-1, and 21c-1 among nozzle 31A. Ink is breathed out also from the nozzle which can come, simultaneously is not located right above the conveyance belts 21A, 21B, and 21C among nozzle 31A.

[0066] Then, if hole 21a-2-21a-5, 21b-2-21b-5, and 21c-2-21c-5 carry out sequential migration just under a print head 31 Ink is breathed out one by one also to hole 21a-2-21a-5 which have moved, 21b-2-21b-5, and 21c-2-21c-5 from the nozzle located among nozzle 31A right above hole 21a-2-21a-5, 21b-2-21b-5, and 21c-2-21c-5. By this, ink will be breathed out from all nozzle 31A arranged by the print head 31.

[0067] Next, ink is breathed out by the actuation of a print head 31 mentioned above, and the same actuation also from all the nozzles arranged by each of print heads 32-34.

[0068] And if ink is breathed out from each nozzle of print heads 31-34, in the recovery device section 6, the ink breathed out from each nozzle of print heads 31-34 will be absorbed with Absorbers 61A-64A.

[0069] The ink absorbed by Absorbers 61A-64A being alike, respectively is held with the recovery frames 61B-64B, and the ink held with the recovery frames 61B-64B is attracted by pumping plant (un-illustrating) after that through the ink pipes 61C-64C and Tubes 61D-64D.

[0070] it mentioned above -- as -- this gestalt -- setting -- many, when continuation printing is performed to the form 12 of several sheets Whenever the printing time amount Tp which has passed after printing to a form 12 was started exceeds the predetermined time amount T Ink is breathed out from each of print heads 31-34 between the papers of a form 12, and it is constituted so that Absorbers 61A-64A may be alike, respectively and this ink may be absorbed. By this Recovery of print heads 31-34 can be performed without interrupting printing actuation.

[0071] Moreover, although it is constituted so that recovery between papers may be performed after it is checked that a form 12 does not exist in this gestalt on two or more holes formed on the conveyance belts 21A and 21B and 21C in two sensors, the paper sensor 27 and the hole detection sensor 28 when the recovery between papers is needed, after interrupting feed processing of the form 12 in feed equipment 1, you may be the configuration which detection of hole 21a-1 is started in the hole detection sensor 28, and other holes are alike, respectively, receives, and carries out the regurgitation of the ink one by one.

[0072]

[Effect of the Invention] As explained above, in this invention, a conveyance belt has two or more holes. Furthermore, a recovery device means to perform recovery of a print head is established so that it may counter with a print head through a conveyance belt, and it sets for a printing means. The ink which ink was breathed out to two or more holes formed in the conveyance belt from this print head in the printing location of a print head, and was breathed out from the print head at the time of the recovery of a print head is absorbed in the recovery device section.

[0073] Thereby, recovery of a print head can be performed, without moving a print head from a printing location.

[0074] moreover, this invention -- setting -- many -- when continuation printing is performed to the form of several sheets, the ink for performing recovery of a print head to this print head to the timing to which a form does not exist on a conveyance belt is breathed out.

[0075] Thereby, printing actuation cannot be interrupted for the recovery of a print head, and print time amount can be shortened.

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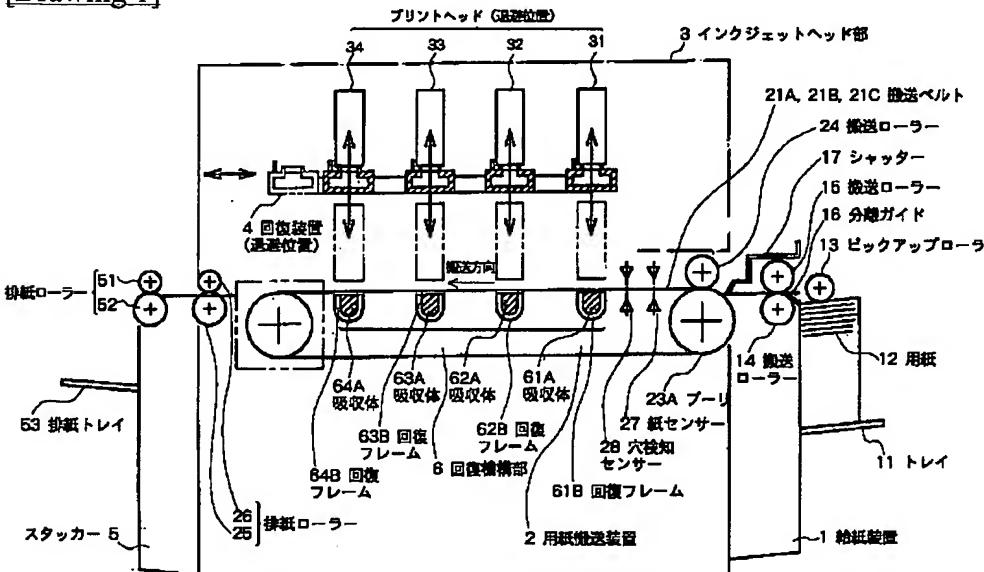
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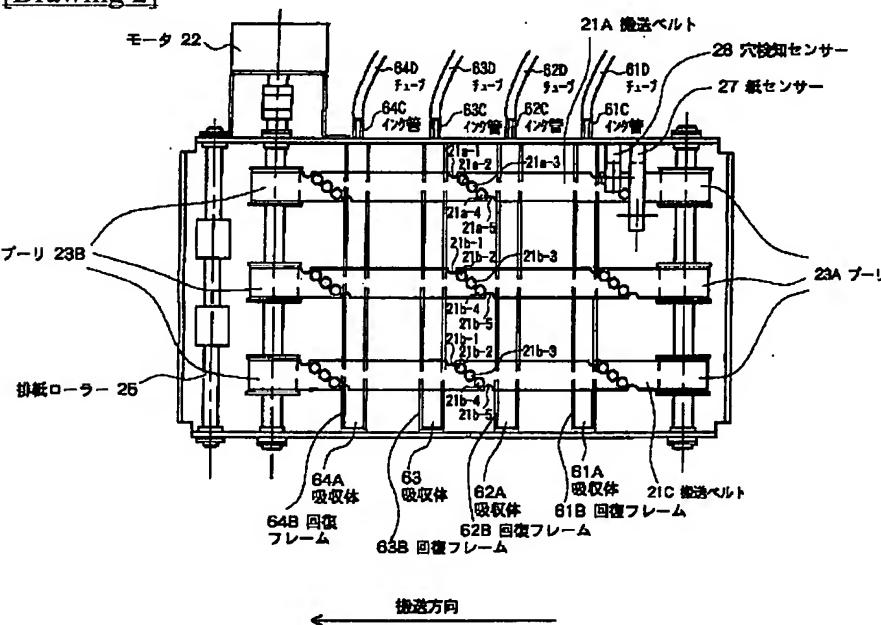
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## DRAWINGS

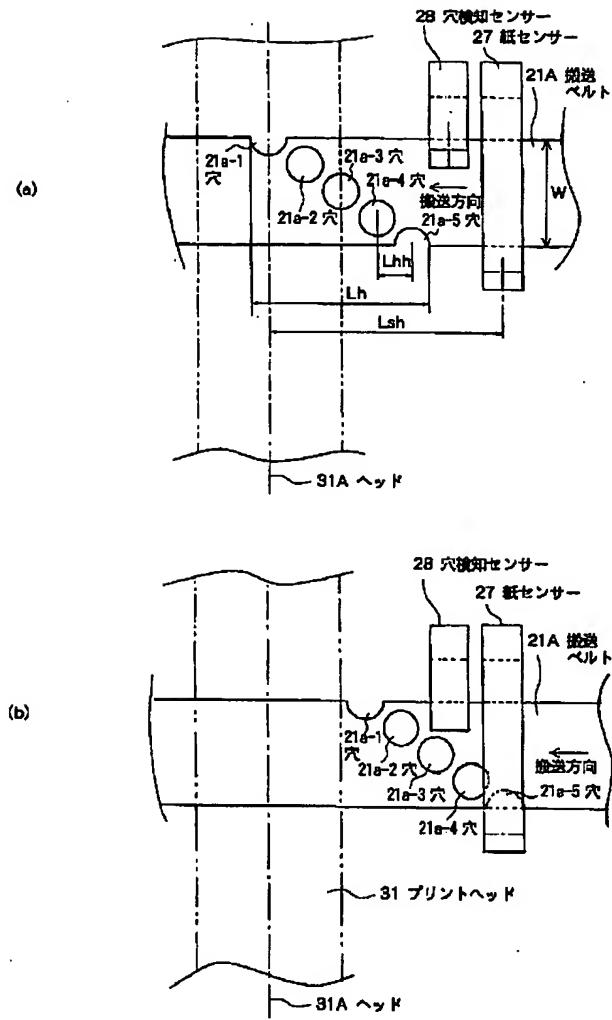
## [Drawing 1]



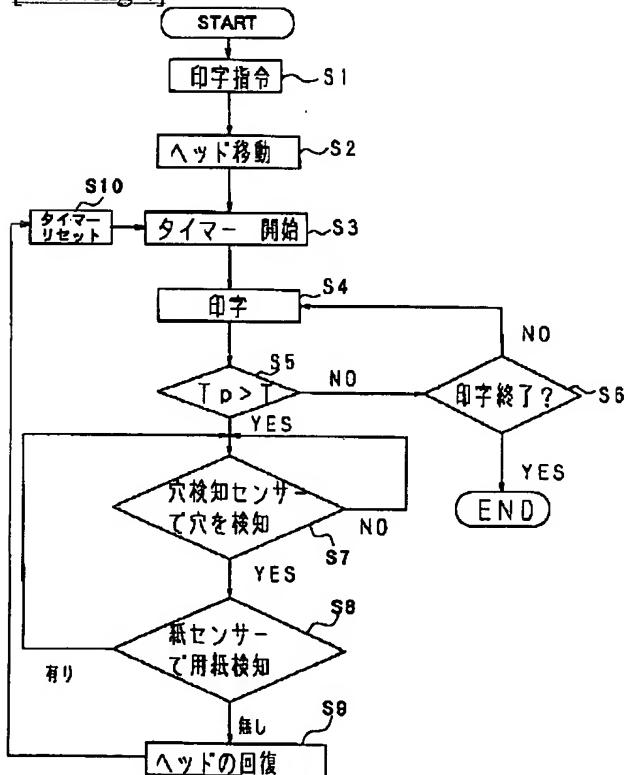
## [Drawing 2]



## [Drawing 3]



[Drawing 4]



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